CLAIMS

1. A polymerization process wherein at least one peroxide, with a half life in between 1 hour and 0.001 hour at the polymerization temperature at the moment of dosing, is dosed to the reaction mixture at the polymerization temperature and wherein at least during part of the period in which the peroxide is dosed i) the cooling means of the reactor are kept at essentially maximum cooling capacity and ii) the amount of initiator that is dosed is actively controlled by a temperature controller such that the desired polymerization temperature is achieved and maintained within 0.3°C of said polymerization temperature.

2. The polymerization process of claim 1 wherein the polymerization temperature is maintained within 0.2°C, preferably within 0.1°C, of said polymerization temperature.

3. The polymerization process of either of claims 1 and 2 wherein the temperature controller controls the temperature of the reaction mixture by monitoring the temperature of the reaction mixture and/or the pressure of the gas phase in the polymerization reactor during the polymerization reaction, while at the same time adjusting the dosing rate of the initiator to the reaction mixture.

4. The polymerization process of any one of claims 1 to 3 wherein the polymer obtained has a K-value within 0.3 units of the desired K-value, preferably within 0.2 units of the desired K-value.

5. The polymerization process of any one of the preceding claims wherein the temperature is controlled by a temperature controller selected from the

group consisting of a PID controller, a PI controller, a PD controller, and a fuzzy logic controller.

6. A polymerization process according to claim 5 wherein the controller is a PID controller using a proportional band, characterized in that the proportional band of the PID controller is in the range of from 0.6% to 2.5%.

7. A polymerization process according to claim 6 wherein the temperature sensing means are linked to the proportional and integral input signals of the PID controller and wherein reactor pressure sensing means are linked to the derivative function of the PID controller during at least part of the period in which the peroxide is dosed.

8. A polymerization process according to any one of the preceding claims wherein vinyl chloride is polymerized, optionally together with other monomers.

9. A polymerization process according to any one of the preceding claims wherein the polymerization process is a suspension polymerization process.

10. An initiator dosing unit comprising:

(a) a temperature controller having at least one temperature input for receiving signals from a temperature sensing means and/or at least one pressure input for receiving signals from a pressure measuring means, and an output for sending signals to a dosing unit; and

(b) a dosing unit comprising a initiator storage container which is connected to a dose rate controlling means.